Claims:

1. A fluid injection system for controlling the distribution of fluid from a supply line to a selected well at an adjustable rate, comprising:

a metering body having a bore for containing fluid;

a fluid barrier segregating the bore into variable-volume first and second chambers, the fluid barrier movable in response to a pressure difference between the first and second chambers;

a first input-output port for passing fluid into and out of the first chamber, and a second input-output port for passing fluid into and out of the second chamber;

a multi-position valve comprising a first position for passing fluid from the supply line into the first chamber, thereby moving the fluid barrier to displace fluid from the second chamber back through the valve to an injection point, and a second position for passing fluid from the supply line to the second chamber, thereby moving the fluid barrier to displace fluid from the first chamber back through the valve to the injection point, the valve further comprising a variable valve opening for controlling flow between the supply line and the metering body;

a position sensor for sensing position of the fluid barrier within the metering body; and

a control system in communication with the position sensor and including a timer for timing displacement of the fluid barrier to selected positions, the control system for selectively adjusting the variable valve opening in response to displacement time of the fluid barrier and for selectively reversing the position of the multi-position valve in response to position of the fluid barrier.

2. A system as defined in Claim 1, wherein the metering body comprises a fluid cylinder having a substantially circular bore and the fluid barrier comprises a piston.

3. A system as defined in Claim 1, wherein the multi-position valve further comprises:

a gate valve having a variable position gate for selectively positioning with respect to a flow path.

4. A system as defined in Claim 3, further comprising:

a stepper motor in communication with the control system for driving a ball screw to position the gate with respect to the flow path.

5. A system as defined in Claim 1, wherein the position sensor comprises:

a proximity sensor for sensing that the fluid barrier has reached one or more of the selected positions.

6. A system as defined in Claim 1, wherein the selected positions of the fluid barrier include opposing ends of the metering body.

7. A system as defined in Claim 6, wherein the position sensor comprises:

a pressure sensor for sensing a pressure reduction in fluid flowing from the metering body corresponding to displacement of the fluid barrier to the opposing ends of the metering body.

8. A system as defined in Claim 1, further comprising:

the control system selectively increasing the valve opening to a substantially fully-open cleaning position.

9. A system as defined in Claim 8, wherein the control system opens the valve to the cleaning position as a function of a preselected number of displacement cycles.

10. A system as defined in Claim 8, wherein the control system opens the valve to the cleaning position in response to increasing time intervals corresponding to a decreasing flow rate.

11. A system as defined in Claim 8, further comprising:

a valve pressure sensor for sensing a reduced flow rate through the valve opening, in response to which the control system opens the valve to the cleaning position.

12. A system as defined in Claim 8, wherein the control system decreases the valve opening temporarily to reduce the flow rate, to compensate for an increased flow rate when at the cleaning position.

13. A system as defined in Claim 1, wherein the control system selectively pauses prior to reversing the position of the multi-position valve, to decrease the average flow rate from the metering body to the injection point.

14. A fluid injection system for controlling the distribution of fluid from a supply line to a selected well at an adjustable rate, comprising:

a fluid cylinder having a substantially circular bore for containing fluid;

a piston segregating the bore of the fluid cylinder into variable-volume first and second chambers, the piston movable in response to a pressure difference between the first and second chambers;

a first input-output port for passing fluid into and out of the first chamber, and a second input-output port for passing fluid into and out of the second chamber;

a multi-position gate-type valve comprising a variable position gate movable with respect to a valve opening for selectively adjusting flow rate between the supply line and the fluid cylinder, the multi-position valve further comprising a first position for passing fluid from the supply line into the first chamber, thereby moving the piston to displace fluid from the second chamber

back through the valve to an injection point, and a second position for passing fluid from the supply line to the second chamber, thereby moving the piston to displace fluid from the first chamber back through the valve to the injection point;

a position sensor for sensing position of the piston within the fluid cylinder, the position sensor comprising a proximity sensor for sensing that the piston has reached selected positions including opposing ends of the fluid cylinder; and

a control system in communication with the position sensor and including a timer for timing displacement of the piston to selected positions, the control system for selectively adjusting the position of the gate in response to displacement time of the piston, for selectively reversing the position of the multi-position valve in response to position of the piston, and for selectively moving the gate to a substantially fully-open cleaning position.

15. A system as defined in Claim 14, further comprising:

a stepper motor in communication with the control system for driving a ball screw to position the gate with respect to the flow path.

16. A system as defined in Claim 14, wherein the position sensor comprises:

a pressure sensor for sensing a pressure reduction in fluid flowing from the fluid cylinder corresponding to displacement of the piston to either of the opposing ends of the fluid cylinder.

17. A system as defined in Claim 14, wherein the control system moves the gate to the cleaning position as a function of a preselected number of displacement cycles.

18. A system as defined in Claim 14, wherein the control system moves the gate to the cleaning position in response to increasing time intervals corresponding to a decreasing flow rate.

19. A system as defined in Claim 14, further comprising:

a valve pressure sensor for sensing a reduced flow rate through the valve opening, in response to which the control system moves the gate to the cleaning position.

20. A method of controlling the distribution of fluid from a supply line to a selected well at an adjustable rate, comprising:

providing a metering body having a bore for containing fluid;

providing a fluid barrier segregating the bore into variable-volume first and second chambers, the fluid barrier movable in response to a pressure difference between the first and second chambers, a first input-output port for passing fluid into and out of the first chamber, and a second input-output port for passing fluid into and out of the second chamber;

providing a multi-position valve comprising a first position for passing fluid from the supply line into the first chamber, thereby moving the fluid barrier to displace fluid from the second chamber back through the valve to an injection point, and a second position for passing fluid from the supply line to the second chamber, thereby moving the fluid barrier to displace fluid from the first chamber back through the valve to the injection point, the valve further comprising a variable valve opening for controlling flow between the supply line and the metering body;

providing a position sensor for sensing position of the fluid barrier within the metering body;

timing displacement of the fluid barrier to selected positions;

selectively adjusting the variable valve opening in response to displacement time of the fluid barrier; and

selectively reversing the position of the multi-position valve in response to position of the fluid barrier.

21. A method as defined in Claim 20, wherein the metering body comprises a fluid cylinder having a substantially circular bore and the fluid barrier comprises a piston.

22. A method as defined in Claim 20, further comprising:

the multi-position valve including a gate valve having a variable position gate; and

selectively positioning the gate with respect to a flow path.

23. A method as defined in Claim 22, further comprising:

providing a stepper motor and a ball screw connected with the gate; and

positioning the gate with respect to the flow path.

24. A method as defined in Claim 20, wherein the position sensor comprises:

a proximity sensor for sensing that the fluid barrier has reached one or more selected positions.

25. A method as defined in Claim 20, wherein the selected positions of the fluid barrier include opposing ends of the metering body.

26. A method as defined in Claim 25, wherein the position sensor comprises:

a pressure sensor for sensing a pressure reduction in fluid flowing from the metering body corresponding to displacement of the fluid barrier to the opposing ends of the metering body.

27. A method as defined in Claim 20, further comprising:

selectively increasing the valve opening to a substantially fully-open cleaning position.

28. A method as defined in Claim 20, further comprising:

opening the valve to the cleaning position as a function of a preselected number of displacement cycles.

29. A method as defined in Claim 27, further comprising:

opening the valve to the cleaning position in response to increasing time intervals corresponding to a decreasing flow rate.

30. A method as defined in Claim 27, further comprising:

providing a valve pressure sensor for sensing a reduced flow rate through the valve opening; and

opening the valve to the cleaning position in response to the reduced flow rate.

31. A method as defined in Claim 27, further comprising:

decreasing the valve opening temporarily to reduce the flow rate, to compensate for an increased flow rate when at the cleaning position.

32. A method as defined in Claim 20, further comprising:

selectively pausing prior to reversing the position of the multi-position valve, to decrease the average flow rate from the metering body to the injection point.